

Distinct Spatio-Temporal & Spectral Brain Patterns for Different Thermal Stimuli Perception

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Power analysis of theta, beta, and gamma EEG frequency bands

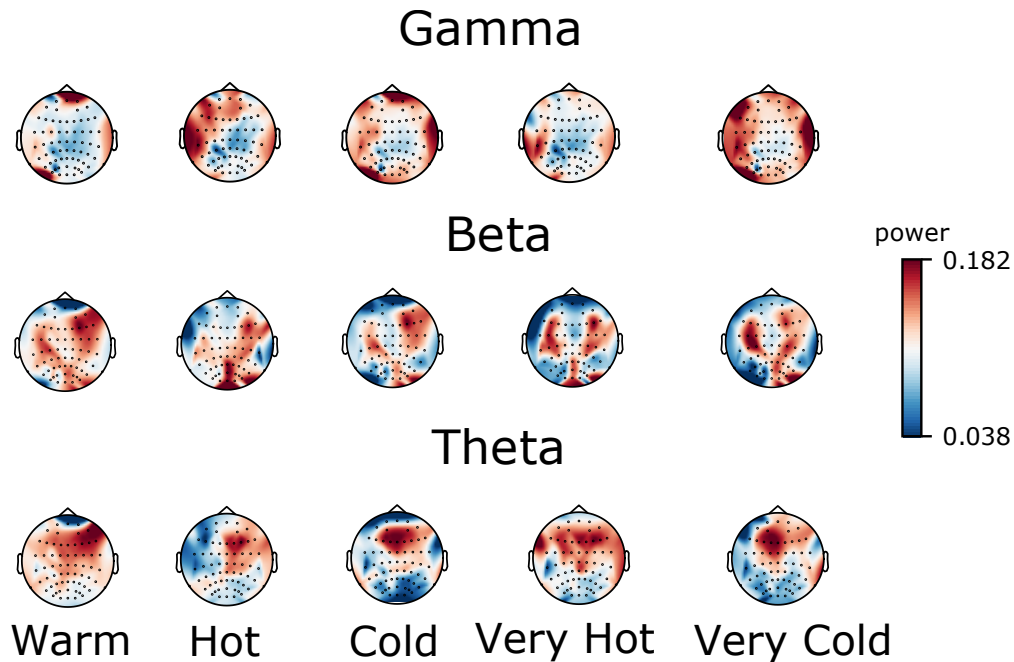


Figure 1. Obtained power results from theta, beta and gamma frequency bands.

Spatial-temporal patterns for the pre-stimulus phase

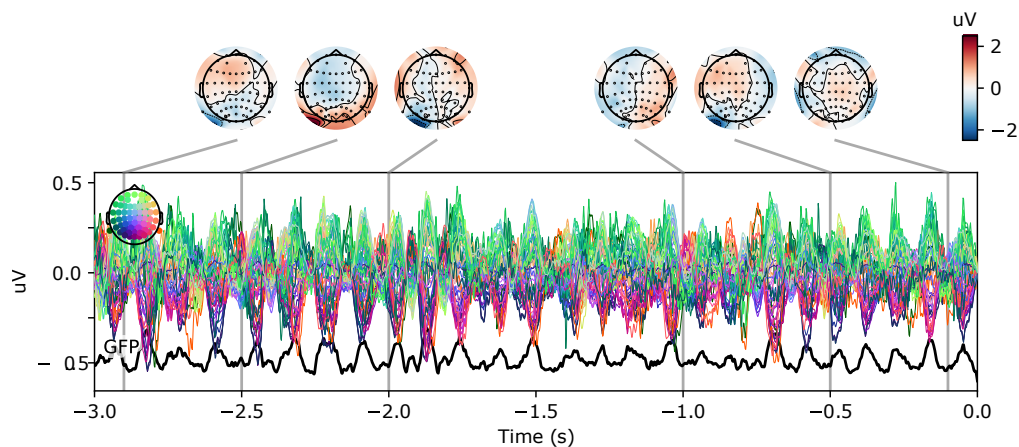


Figure 2. Spatial-temporal patterns for the pre-stimulus phase.

Very cold stimuli dominating very hot one when stimulating both hands

In a separate trial, the three subjects were exposed to both NOX stimuli at the same time. Very cold stimulus was delivered on the left hand, whereas very hot was delivered on the right hand. The very cold stimulus was scored more intense (scored 7 in average at a thermal sensation scale from 0 to 9) than the very hot stimulus (rated 4 in average using the same scoring scale). Interestingly, as illustrated in Figure 3 (A), the very cold showed higher contralateral decrease in alpha power (right side) than the very hot (left side). Similarly, higher frontal and central activity were detected for very cold (contralateral side to the stimulation) compared to the very hot. These results confirm the main findings of the study, where a pronounced decrease of alpha power for both conditions but the most intense condition dominated the slightly intense one. This decrease was interpreted by an ERD resulting from a motor movement imagination. The high fronto-central activation for both conditions is in accordance with our main findings, revealing, therefore, the importance of the the regions in noxious stimuli thermal perception and processing. Investigations of the brain reaction when stimulating both hands with two different NOX stimuli should be further considered in future studies.

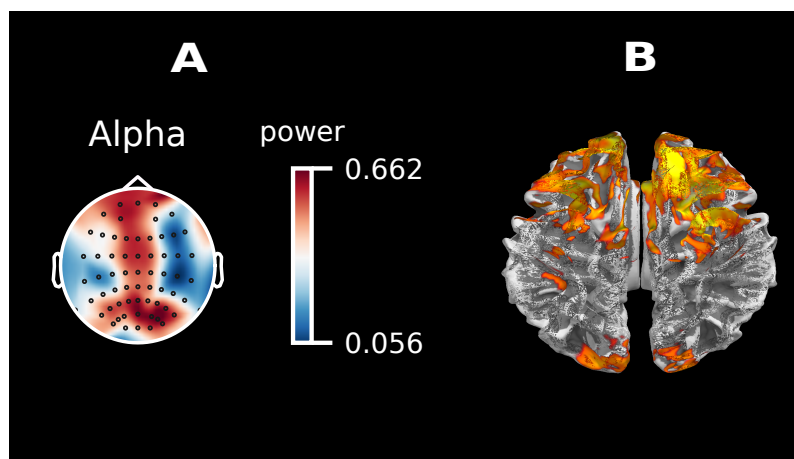


Figure 3. Both hands stimulation main results. **A.** EEG alpha power topographic map. **B.** EEG source localization analysis for all the three subjects.

Both stimuli thermal sensation scoring

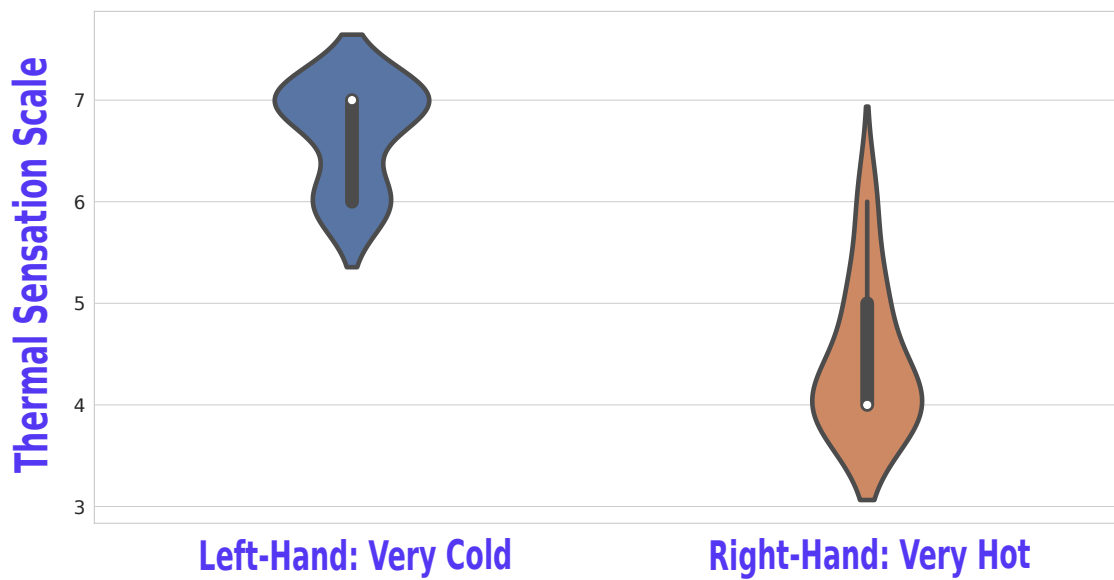


Figure 4. Both hand stimulations thermal sensation scoring from 0 to 9, where 9 is intolerable sensation.

Very Cold stimulation localized source for for the interval 200 to 500 ms post-stimulation

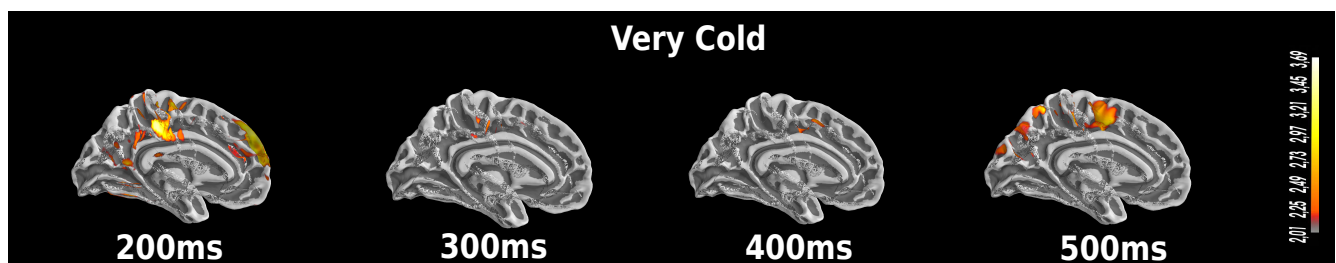


Figure 5. The most intense condition source localization for the time window [200 - 500] ms.